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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,913	04/12/2004	Hideki Sato	P9219.0007	2455

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EXAMINER	
SCHINDLER, DAVID M	

ART UNIT	PAPER NUMBER
2858	

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01/20/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/821,913	SATO ET AL.	
	Examiner	Art Unit	
	DAVID M. SCHINDLER	2858	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 September 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-6,8,18 and 19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *3 and 19* is/are allowed.

6)☒ Claim(s) *2,4,8 and 18* is/are rejected.

7)☒ Claim(s) *5 and 6* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 10/052,525.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to the communication filed 9/14/2009.

2. In view of applicant's amendment to claim 4 of application 11/682841, the statutory rejection of claim 8 under 35 U.S.C. 101 is withdrawn. Applicant's amendment to the claims with regard to the claim objections to claims 2, 3, 8, and 18 is accepted. Upon further consideration, any previous indication of allowability with regard to the claims is withdrawn except for those claims indicated as allowable in this office action.

Response to Arguments

3. Applicant's arguments with respect to claims 2 and 8 have been considered but are moot in view of the new ground(s) of rejection.

4. Applicant's arguments, see page 2 of the Remarks, filed 9/14/2009, with respect to the rejection(s) of claim(s) 2 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Van Den Berg (US 6,313,627).

Claim Objections

5. Claim 4 is objected to because of the following informalities:

6. As to Claim 4,

7. The phrase "a second center line of the top side and the bottom side" as recited for example on line 2 under claim feature (e) is awkward in that a first center line of the top side and bottom side has not been previously introduced.

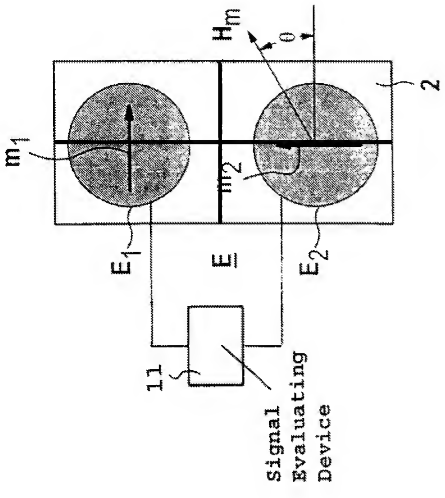
8. Appropriate correction is required.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claim 2 is rejected under 35 U.S.C. 102(b) as being anticipated by Van Den Berg (US 6,313,627).



11.

12. As to Claim 2,

13. Van Den Berg discloses a plurality of magnetoresistance effect elements (E1 and E2), each including a spin valve film, the spin valve film including a free layer (soft / measurement layer (7)), a spacer layer (6), and a pinned layer (5) whose magnetization direction is pinned ((Column 4, Lines 9-48) and (Figures 1 and 2), wherein the layers are successively laminated on a substrate of a signal chip (Figures 1 and 2), the substrate

having a rectangular shape which has two sides along an X-axis and two sides along a Y-axis (Figure 2), the X-axis and the Y-axis being perpendicular to each other in plan view (see the above figure in paragraph 7 of this office action / note the lines drawn), each of the magnetoresistance effect elements having a resistance value that changes in accordance with a relative angle formed by the magnetization direction of the pinned layer and a magnetization of the free layer (Column 4, Lines 9-48), the magnetic sensor being formed in such a manner that the plurality of the magnetoresistance effect elements are provided on a single plane ((Figures 1 and 2) and (Column 4, Lines 39-67) and (Column 5, Lines 1-40)), the plurality of the magnetoresistance effect elements are placed symmetrically with respect to center lines of the rectangular shape (see the above figure in paragraph 7 of this office action / note that both sensors are placed symmetrically about both the X-axis and Y-axis lines), one of the center lines is a center line of the two sides along the X-axis and perpendicular to the Y-axis and the other of the center lines is a center line of the two sides along the Y-axis and perpendicular to the X-axis (Figure 2 / also note the above figure in paragraph 7 of this office action), and the pinned layers of at least two of the plurality

of magnetoresistance effect elements have pinned magnetization directions that cross each other (note m1 and m2 of Figure 2).

14. Claim 8 is rejected under 35 U.S.C. 102(b) as being anticipated by ADELERHOF (WO 00/79298).

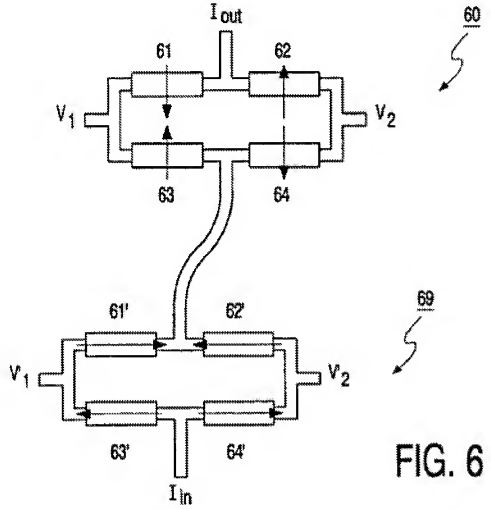


FIG. 6

15.

16. As to Claim 8,

17. ADELERHOF discloses a plurality of magnetoresistance effect elements (61-64 and 61'-64'), each element including a spin valve film, the spin valve film including a free layer, a spacer layer, and a pinned layer having a pinned magnetization direction (Page 19, Lines 3-21), each magnetoresistance effect element having a resistance value that changes in accordance with a relative angle formed by a magnetization direction of the pinned layer and a magnetization direction of the free layer (Page 19, Lines 3-21), wherein the layers of each of the magnetoresistance effect elements are successively laminated directly on a single substrate of a single chip ((Page 19, Lines 29-30) and (Page 20, Lines 1-5)), an X-axis group of four of a plurality of the magnetoresistance effect elements constructs a signal X-axis magnetic sensor for detecting a magnetic field in an X-axis direction (see bridge (69) in Figure 6), and all of the magnetoresistance effect elements of the X-axis group having pinned magnetization directions of the pinned layers parallel to each other (Figure 6), the X-axis group of magnetoresistance effect elements construct the X-axis magnetic sensor by full bridge connection (Figure 6), and the pinned magnetization directions of the X-axis group of magnetoresistance effect elements are in the X-axis direction (Figure 6), a Y-axis group of four of a plurality of the magnetoresistance effect elements

constructs a single Y-axis magnetic sensor (see bridge (60) in Figure 6) for detecting a magnetic field in a Y-axis direction perpendicular to the X-axis direction and all of the magnetoresistance effect elements of the Y-axis group have pinned magnetization directions of the pinned layers parallel to each other (Figure 6), the Y-axis group of magnetoresistance effect elements construct the Y-axis magnetic sensor by full bridge connection (Figure 6), and the pinned magnetization directions of the Y-axis group of magnetoresistance effect elements are in the Y-axis direction ((Figure 6) and (Page 19, Lines 3-21)).

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

19. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

20. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

21. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over ADELERHOF (WO 00/79298).

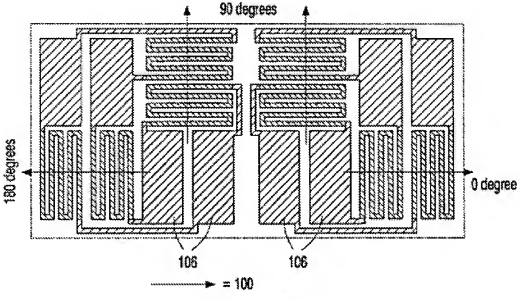


FIG. 10

22.

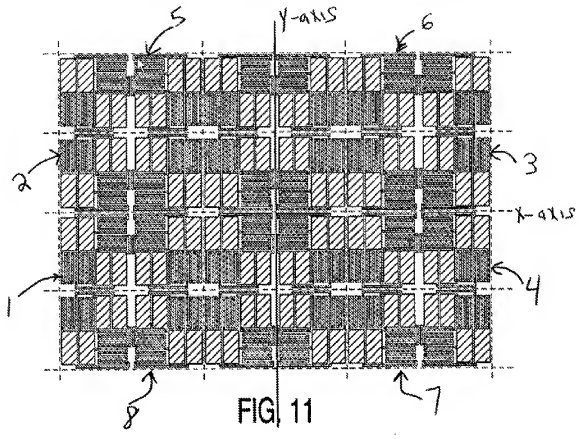


FIG. 11

23.

24. As to Claim 4,

25. ADELERHOF discloses eight magnetoresistance effect elements including a first through an eighth element, each of the elements including a spin valve film, the film including a free layer and a pinned layer, the pinned layer having a pinned magnetization direction ((Page 1, Lines 9-26) and (Page 13, Lines 10-20)), the layers are successively laminated on a substrate of a single chip ((Figure 11/ note that this is a circuit level layout and thus must be on a substrate/wafer /

additionally note Figure 9 has similar dotted cut lines and describes the sensors on a wafer together (Page 20, Lines 24-27))), the substrate having a shape which has a left side along a Y-axis, a right side along the Y-axis, a top side along an X-axis, and a bottom side along the X-axis in a plan view, the X-axis and the Y-axis are perpendicular to each other (Figure 11 / note that any shape includes this feature), and each of the elements has a resistance value that changes in accordance with a relative angle formed by a magnetization direction of the pinned layer and a magnetization direction of the free layer ((Page 1, Lines 9-26) and (Page 13, Lines 10-20)), the magnetic sensor being formed in such a manner that the magnetoresistance effect elements are provided on a single plane (Figure 11 / note that this Figure discloses a circuit level layout), and

(a) said first element being formed at a position closer to the left side than the right side and below a first center line of the left side and the right side, the first center line being perpendicular to the Y-axis, and said first element, having a pinned magnetization direction of said first element's pinned layer in a direction of the X-axis;

(b) said second element being formed at a position closer to the left side than the right side and above the first center line, and said second element having a pinned magnetization direction of said second element's pinned layer in the direction of the X-axis;

(c) said third element being formed at a position closer to the right side than the left side and above the first center line, and said third element having a pinned magnetization direction of said third element's pinned layer in the direction of the X-axis;

(d) said fourth element being formed at a position closer to the right side than the left side and below the first center line, and said fourth element having a pinned magnetization direction of said fourth element's pinned layer in the direction of the X-axis;

(e) said fifth element being formed at a position closer to the top side than the bottom side and left of a second center line of the top side and the bottom side, the second center line being perpendicular to the X-axis, and said fifth element having a pinned magnetization direction of said fifth element's pinned layer in the direction of the Y-axis;

(f) said sixth element being formed at a position closer to the top side than the bottom side and right of the second center line, and said sixth element having a pinned magnetization direction of said sixth element's pinned layer in the direction of the Y-axis;

(g) said seventh element being formed at a position closer to the bottom side than the top side and right of the second center line, and said seventh element having a pinned magnetization direction of said seventh element's pinned layer in the direction of the Y-axis; and

(h) said eighth element being formed at a position closer to the bottom side than the top side and left of the second center line, and said eighth element having a pinned magnetization direction of said eighth element's pinned layer in the direction of the Y-axis.

26.

27. (for the above eight elements see the above marked up Figure 11 in paragraph 19 of this office action / with regard to the pinned directions, note that Figure 11 is a matrix of the

sensor shown in Figure 10 which can be seen in the above paragraph 18 of this office action.

28. ADELERHOF does not disclose with regard to Figure 11 that the substrate has a rectangular shape.

29. However, it would have been obvious to a person of ordinary skill in the art at the time of invention to utilize a rectangular shaped substrate like what is disclosed in Figure 10 of ADELERHOF as it would have been obvious to try various shapes and furthermore it would have been obvious to change the shape to utilize a rectangular shaped wafer given the above disclosure and teaching of ADELERHOF in order to minimize excess semiconductor material around the sides of the sensors that is unwanted or unneeded and thus reduce cost (note KSR International Co. v. Teleflex Inc. (KSR), 550 U.S. ___, 82 USPQ2d 1385 (2007) - MPEP 2143(E) / and MPEP 2144.04(B)).

30. (It is noted that there is a limited number of shapes that a wafer can have, and it is desirable to have the above rectangular shape for the reasons stated above. Furthermore, any placement of what is disclosed in Figure 11 on a substrate will allow for the above placement, axis, and center line requirements of this claim. Finally, the Examiner notes in view of the previous arguments that the use of the phrase "a magnetic sensor" as recited in the preamble is a broad recitation, and

while what is disclosed in Figure 11 may be disclosed to have cut-out lines, any combination of individual elements/sensors constitute a magnetic sensor as recited in the above claim. Applicant is not claiming or positively reciting that these eight sensors are interconnected together or that they are utilized together to sense a magnetic field).

31. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over ADELERHOF (WO 00/79298) in view of Van Delden et al. (Van) (US 6,100,686).

32. As to Claim 18,

33. ADELERHOF does not disclose the Y-axis sensor is disposed within an area defined by the X-axis sensor.

34. Van discloses one magnetic sensor bridge (a Y-axis sensor is disposed within an area defined by another magnetic sensor bridge ((Figure 2) and (Column 4, Lines 22-27).

35. It would have been obvious to a person of ordinary skill in the art at the time of invention to modify ADELERHOF to include the Y-axis sensor is disposed within an area defined by the X-axis sensor given the above disclosure and teaching of Van in order to utilize a small a space as possible for the sensor, provide a compact sensor, and to minimize the amount of material

(for a casing) needed to surround the sensor, thus reducing cost.

Allowable Subject Matter

36. Claims 3 and 19 are allowed.

37. Claims 5 and 6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

38. The following is an examiner's statement of reasons for allowance:

39. As to Claim 3,

40. Please see the office action of 3/24/2009.

41. As to Claim 5,

42. The primary reason for the allowance of claim 5 is the inclusion of the first to fourth elements construct an X-axis magnetic sensor for detecting a magnetic field in the direction of the X-axis by full bridge connection of the first to fourth elements, and the fifth to eighth elements construct a Y-axis magnetic sensor for detecting a magnetic field in the direction of the Y-axis by full bridge connection of the fifth to eighth elements. It is these features found in the claim, as they are claimed in the combination that has not been found, taught or

suggested by the prior art of record, which makes this claim allowable over the prior art.

43. As to Claim 19,

44. The primary reason for the allowance of claim 19 is the inclusion of

> four of said plurality of magnetoresistance effect elements being coupled to comprise a single axis magnetic sensor by full bridge connection of the four elements, the single axis magnetic sensor being:
>
> an X-axis magnetic sensor for detecting a magnetic field along the X-axis, wherein said pinned magnetization directions of the pinned layers of the four elements are parallel to each other and anti-parallel between two of the four elements placed symmetrically with respect to the center line of the two sides along the Y-axis and perpendicular to the X-axis, or
>
> a Y-axis magnetic sensor for detecting a magnetic field along the Y-axis, wherein said pinned magnetization directions of the pinned layers of the four elements are parallel to each other and anti-parallel between two of the four elements placed symmetrically with respect to the center line of the two sides along the X-axis and perpendicular to the Y-axis.

It is these features found in the claim, as they are claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

45. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

46. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID M. SCHINDLER whose telephone number is (571)272-2112. The examiner can normally be reached on Monday-Friday (8:00AM-4:30PM).

47. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Assouad can be reached on (571) 272-2210. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

48. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

David M. Schindler
Examiner
Art Unit 2858

/D. M. S./
Examiner, Art Unit 2858
/Patrick J Assouad/
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